EVERGLADES NATIONAL PARK

SUMMARY

MAP

Shark River Slough

The Settlement Agreement of 1991 set separate interim and long-term total phosphorus concentration limits for discharges into the Everglades National Park through Shark River Slough to be met by October 1, 2003, and December 31, 2006, respectively. The limits apply to the water year ending September 30. The long-term total phosphorus concentration limit for inflows to Shark River Slough through structures S12A, S12B, S12C, S12D and S333 represents the concentrations delivered during the Outstanding Florida Waters baseline period of March 1, 1978, to March 1, 1979, and is adjusted for variations in flow. In addition, the Settlement Agreement requires that phosphorus concentrations be presented as 12-month moving flow-weighted means.

Inflow concentrations of total phosphorus through Shark River Slough are compared to the interim and long-term limits at the end of each water year from 1989 to 2000 (**Figure 26a**). The 12-month moving flow-weighted mean total phosphorus concentration ending September 2000 was 10.0 ppb. Corresponding interim and long-term limits were 9.4 and 7.6 ppb, respectively. This is the first time since 1993 that both limits were exceeded for the water year ending in September.

Table 7 presents the moving flow-weighted mean concentrations for each 12-month period beginning with December 1998 as well as the corresponding interim and long-term total phosphorus concentration limits, which are calculated using the 12-month period flow. For the 12-month periods ending in October, November and December 2000, the flow-weighted mean total phosphorus concentrations were 10.3, 11.7 and 12.7 ppb, respectively. These concentrations were all greater than the interim and long-term limits for these respective months.

The Settlement Agreement stipulates that the percent of flow-weighted mean total phosphorus concentrations greater than 10 ppb from each sampling event in any 12-month period must not exceed an allowable value based on flow into Shark River Slough for the same 12-month period (**Figure 26b**). For the 12-month

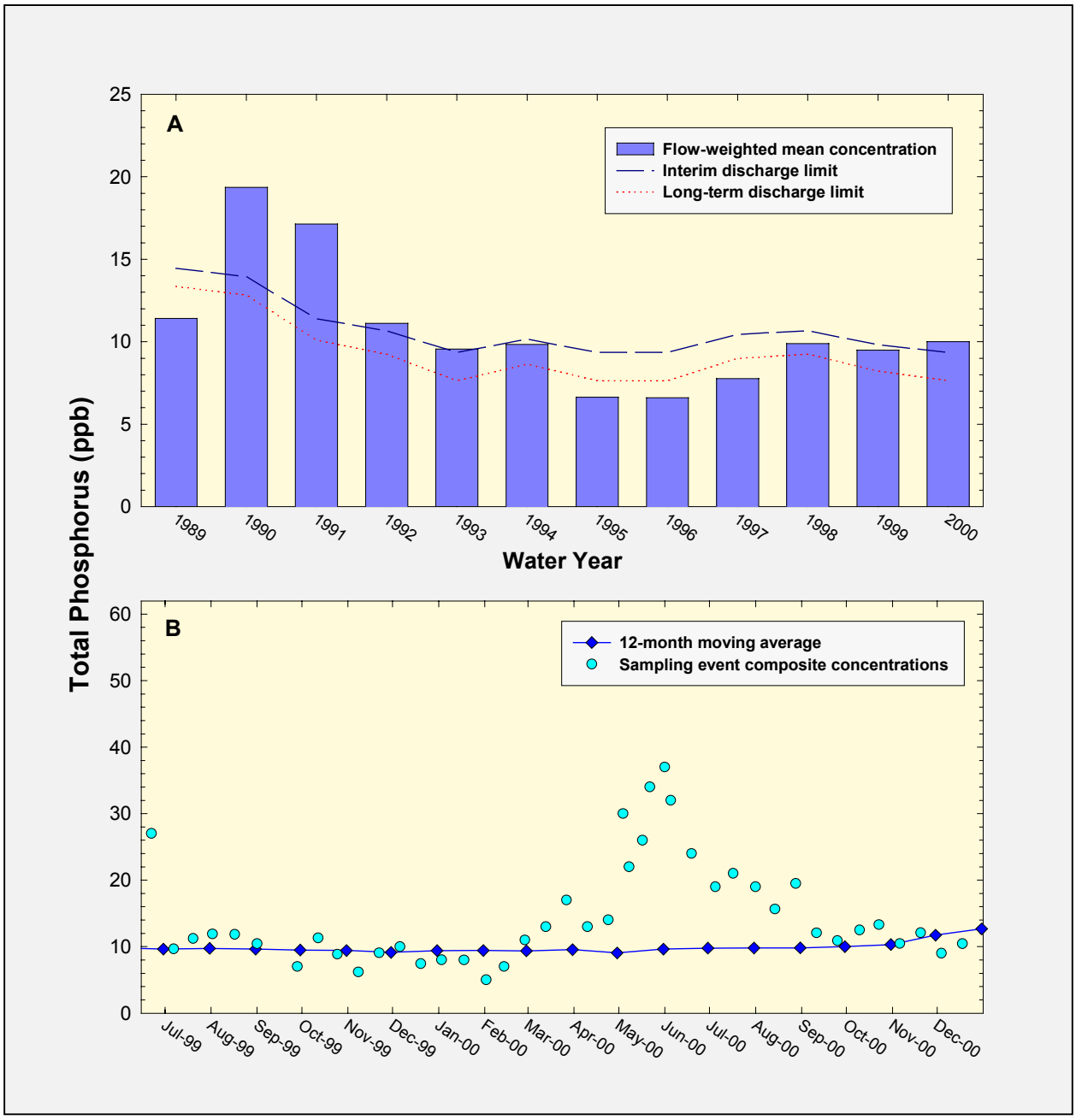

Figure 26. 12-month moving flow-weighted mean total phosphorus concentrations at the inflows to Everglades National Park (ENP) through Shark River Slough compared to the interim and long-term targets. **a.** Concentration at the end of each water year. **b.** 12-month moving average concentration at the end of each month and the composite concentration for each sampling event.

Table 7. Shark River Slough Total Phosphorus Compliance Tracking.

12-Month Period Ending On	Total Period Flow (Kac-ft)	Flow Weighted Mean Total Phosphorus (ppb)	Limits (ppb)		Percent of Samples Greater Than 10 ppb (%)	
			Interim	Long Term	Observed	Allowed
12/31/98	871.4	9.7	10.1	8.6	***57.1***	44.5
1/31/99	852.7	9.4	10.2	8.7	***53.6***	45.0
2/28/99	842.9	9.3	10.2	8.7	***55.6***	45.3
3/31/99	826.7	9.1	10.3	8.8	***51.9***	45.7
4/30/99	750.3	9.9	10.6	9.2	***51.9***	47.7
5/31/99	674.6	9.8	11.0	9.6	48.0	49.9
6/30/99	680.2	9.6	10.9	9.6	40.9	49.7
7/31/99	788.4	9.7	10.4	9.0	41.7	46.7
8/31/99	857.6	9.6	10.1	8.6	39.1	44.9
9/30/99	939.9	9.5	9.8	8.2	39.1	42.9
10/31/99	1084.4	9.4	9.4	7.6	39.1	40.1
11/30/99	1297.5	9.1	9.4	7.6	39.1	40.1
12/31/99	1344.8	9.4	9.4	7.6	39.1	40.1
1/31/00	1395	9.4	9.4	7.6	39.1	40.1
2/29/00	1415	9.4	9.4	7.6	***41.7***	40.1
3/31/00	1386	9.6	9.4	7.6	***52.2***	40.1
4/30/00	1385	9.1	9.4	7.6	***52.2***	40.1
5/31/00	1401	9.6	9.4	7.6	***57.7***	40.1
6/30/00	1396	9.8	9.4	7.6	***60.7***	40.1
7/31/00	1295	9.8	9.4	7.6	***64.3***	40.1
8/31/00	1215	9.8	9.4	7.6	***65.5***	40.1
9/30/00	1096	10.0	9.4	7.6	***69.0***	40.1
10/31/00	925	10.3	9.9	8.3	***72.4***	43.2
11/30/00	642	11.7	11.1	9.8	***79.3***	50.8
12/31/00	464	12.7	12.0	10.8	***82.8***	56.4

Bold and italicized values exceeded allowed percentage

periods ending October, November and December 2000, the percent of flow-weighted mean total phosphorus concentrations greater than 10 ppb was 75.9, 82.8 and 86.2, respectively. These percentages exceeded the allowable limits for all three 12-month periods (**Table 7**).

The daily mean flows through the individual Shark River Slough structures and S334 from July 1999 through December 2000 are presented in **Figure 27a**. As indicated in **Figure 27a**, the majority of flow in October entered northeastern Shark River Slough through the S12 structures. This change in inflow distribution compared to the previous seven months was due to a significant increase in flow resulting from heavy rainfall from October 2 to 4 (see rainfall data in **Table 1**). From the second week in November through December 31, inflows decreased due to very little rainfall. The relationship between the sum of the daily mean flows at Shark River Slough structures and the corresponding flow-weighted mean total phosphorus concentrations for individual sampling events is presented in **Figure 27b**. As can be seen in **Table 7**, decreasing monthly total flows into Shark River Slough from May through December 2000 have resulted in gradually increasing total phosphorus flow-weighted mean concentrations as well as an increase in the percentage of individual sampling date composite concentrations greater than 10 ppb.

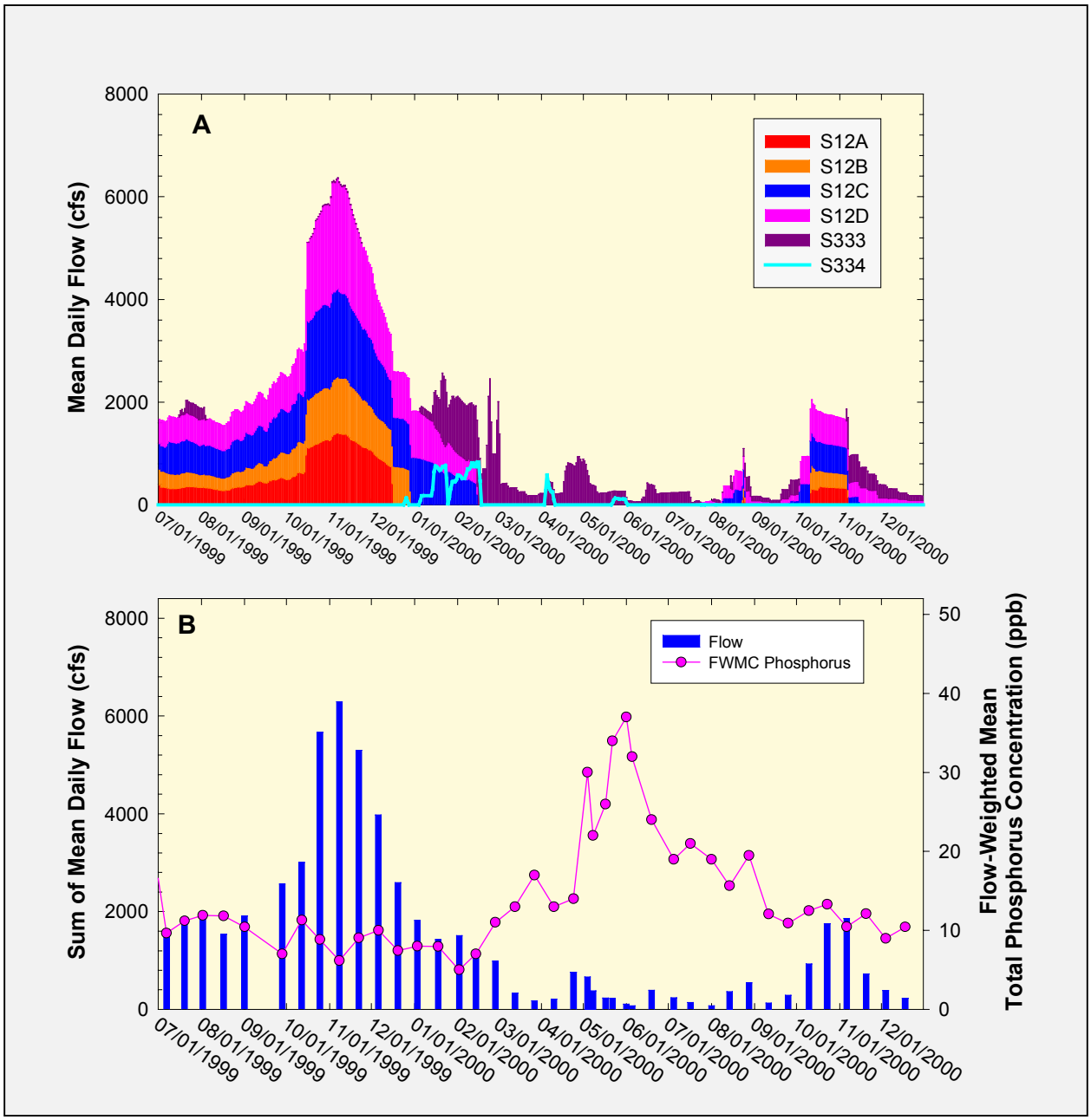

Figure 27. **a.** Mean daily flows into Shark River Slough by structure. **b.** The relationship between sum of mean daily flow at Shark River Slough structures and flow-weighted mean total phosphorus concentration for individual sampling events.

Taylor Slough and The Coastal Basins

Under the Settlement Agreement, a single total phosphorus long-term limit of 11 ppb, to be met by December 31, 2006, was set for the two points of inflow to Taylor Slough (S332 and S175) and the inflow point to the Coastal Basins (S18C). The 11 ppb limit applies to the water year ending September 30. Beginning in August 1999, structure S332D, a new pump station constructed by the U.S. Army Corps of Engineers, began operation. The structure is adjacent to spillway S174 and pumps water from the L31N canal into the L31W canal. The S332D and S174 structures became the new inflow compliance monitoring sites for Taylor Slough on October 1, 1999, replacing S332 and S175. However, the Settlement Agreement's Technical Oversight Committee requested that data from both the old and new pairs of inflow structures to Taylor Slough be presented for one year. This request was made to determine if the differences between the two data sets observed from August 1999 through March 2000 would continue throughout a complete wet season/dry season cycle and what implications this might have on future compliance with the 11 ppb limit.

Inflow concentrations of total phosphorus to the Everglades National Park through Taylor Slough and the Coastal Basins are compared to the 11 ppb limit at the end of each water year using data from both the old (S175, S332, S18C) and new (S174, S332D, S18C) combinations of structures for the 2000 water year (**Figure 28a**). The bars in **Figure 28a** represent the flow-weighted mean total phosphorus concentrations from S332, S175 and S18C for water years 1989 through 2000. The diamond point value for water year 1999 represents the total phosphorus concentrations for S174 and S18C from October 1, 1998 through September 30, 1999 plus the S332D data from August 30, 1999 through September 30, 1999. The diamond point value for 2000 represents total phosphorus concentrations for the entire year from S174, S332D and S18C.

Figure 28b presents the 12-month moving average and individual sampling event flow-weighted mean total phosphorus concentrations at both the old and new combinations of structures. The individual sampling event data for the new combination had been generally greater than those from the old combination through June 2000. From July through December 2000 the individual sampling event data from the new combination has been consistently lower than the old combination.

The 12-month flow-weighted mean concentrations for October, November and December 2000 were 7.9, 7.7 and 7.7 ppb, respectively, at the new combination of structures and 7.9, 8.1 and 8.4 ppb, respectively, for the old combination of structures (**Table 8**). The Settlement Agreement stipulates that the percent of flow-weighted mean total phosphorus concentrations greater

than 10 ppb from each sampling event in any 12-month period must not exceed a fixed value of 53.1 percent. The percentage of flow-weighted mean total phosphorus concentrations greater than 10 ppb for the new combination was 11.4, 12.2 and 12.5 for the periods ending October, November and December, respectively. For these same periods, the percentage for the old combination was 12.1, 13.8 and 14.3, respectively (**Table 8**).

A comparison of flows between the old and new combination of structures is presented in **Figure 29**.

The flow through S18C, along with the combined flows through S332 plus S175 and S332D plus S174, is presented in Figure 25a. The water discharged from the downstream structures, S175 and S332, is supplied through the upstream structures, S174 and S332D. After July 5, 2000 S332 and S175 were closed. Thereafter, flow into Taylor Slough was through S322D until November 27. From November 28 through December 9 inflows to Taylor Slough were through S174. From December 10 through December 31 there were no inflows through S332D or S174. Flows through S18C were continuous except from November 29 through December 9 when flows were diverted through S174. **Figure 29b** shows the relationship between the sum of the daily mean flows at S18C and the Taylor Slough structures and the corresponding flow-weighted mean total phosphorus concentrations for each sampling event at both the old and new combinations of structures.

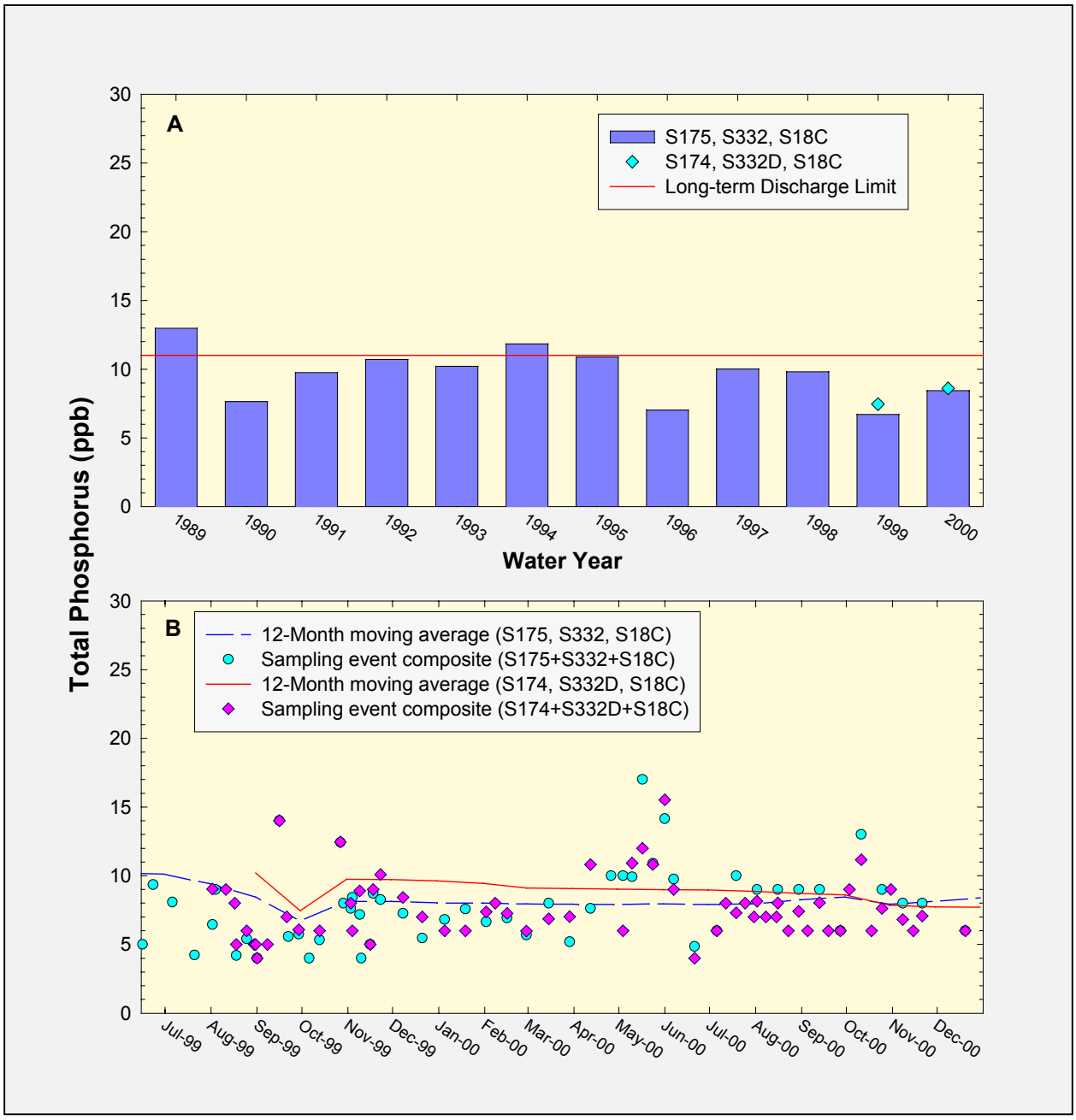

Figure 28. **a.** Flow-weighted mean total phosphorus concentration at the inflows to Everglades National Park through Taylor Slough and the Coastal Basins compared to the 11 ppb long-term total phosphorus limit for each water year. **b.** The 12-month moving average and individual sampling event flow-weighted mean total phosphorus concentraions at both the old and new combinations of compliance monitoring sites.

Table 8. Taylor Slough and Coastal Basins Total Phosphorus Compliance Tracking.

12-Month Period Ending On	Total Period Flow (ac-ft x 10^3)		Flow Weighted Mean Total Phosphorus (ppb)		Long Term Limit (ppb)	Percent of Samples Greater Than 10 ppb			
						Observed (%)		Allowed (%)	
	New	Old	New	Old		New	Old	New	Old
12/31/98	81.29	318.7	11.7	9.9	11.0	38.5	32.1	53.1	53.1
1/31/99	97.67	329.8	11.4	9.8	11.0	34.6	28.6	53.1	53.1
2/28/99	90.69	306.5	12.0	9.6	11.0	30.8	25.0	53.1	53.1
3/31/99	82.6	272.1	12.4	9.9	11.0	26.9	21.4	53.1	53.1
4/30/99	74.57	251.6	12.9	10.0	11.0	33.3	25.0	53.1	53.1
5/31/99	63.4	232.1	13.8	10.2	11.0	40.0	28.6	53.1	53.1
6/30/99	70.04	259.5	13.6	10.1	11.0	44.0	28.6	53.1	53.1
7/31/99	75.96	275.6	12.1	9.4	11.0	37.0	25.0	53.1	53.1
8/31/99	78.96	287.7	10.2	8.5	11.0	25.0	16.7	53.1	53.1
9/30/99	94.00	279.9	7.5	6.7	11.0	17.7	12.1	53.1	53.1
10/31/99	101.66	338.8	9.7	8.1	11.0	22.9	17.1	53.1	53.1
11/30/99	111.70	365.2	9.7	8.1	11.0	23.1	15.4	53.1	53.1
12/31/99	127.20	413.6	9.6	8.0	11.0	22.5	15.4	53.1	53.1
1/31/00	144.3	450.0	9.5	8.0	11.0	22.5	15.4	53.1	53.1
2/29/00	160.0	479.2	9.1	7.9	11.0	21.4	15.0	53.1	53.1
3/31/00	164.5	485.4	9.1	7.9	11.0	22.0	15.4	53.1	53.1
4/30/00	164.8	492.7	9.0	7.9	11.0	20.0	12.8	53.1	53.1
5/31/00	170.2	493.4	9.0	8.0	11.0	23.3	14.6	53.1	53.1
6/30/00	161.7	467.3	9.0	7.9	11.0	23.3	16.7	53.1	53.1
7/31/00	172.9	456.6	8.9	8.0	11.0	20.5	17.1	53.1	53.1
8/31/00	184.2	445.1	8.7	8.3	11.0	20.9	18.0	53.1	53.1
9/30/00	188.0	432.1	8.6	8.4	11.0	19.1	14.3	53.1	53.1
10/31/00	194.8	374.8	7.9	7.9	11.0	15.9	12.1	53.1	53.1
11/30/00	182.3	315.0	7.7	8.1	11.0	14.6	13.8	53.1	53.1
12/31/00	163.0	265.9	7.7	8.4	11.0	15.0	14.3	53.1	53.1

New= S174+S332D+S18C data
Old = S175+S332+S18C data

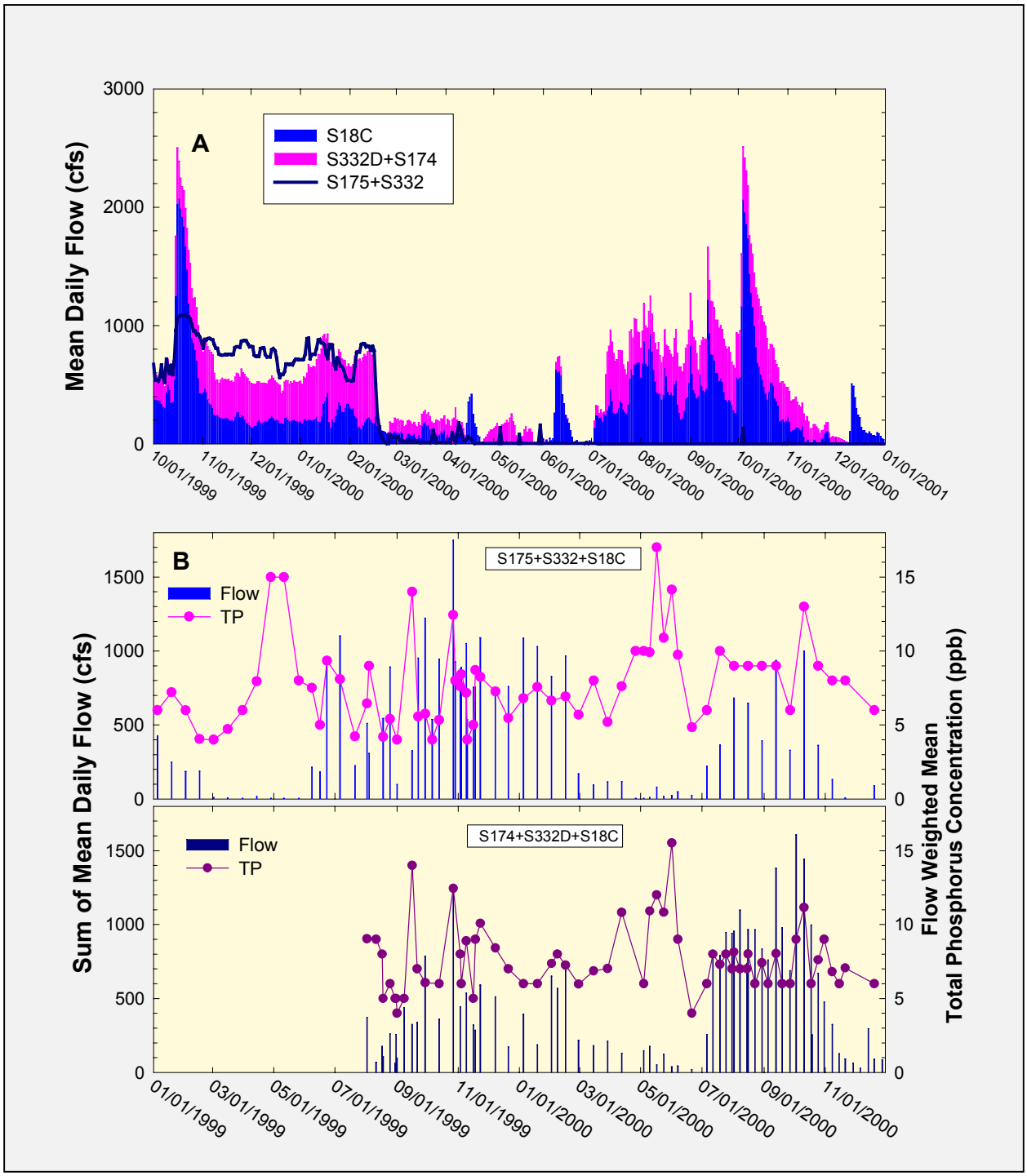

Figure 29. **a.** Daily mean flows into Everglades National Park through Taylor Slough and S18C, the Coastal Basins control structure. **b.** Mean daily flows and corresponding flow-weighted mean total phosphorus concentrations at old and new combinations of Taylor Slough and Coastal Basin structures.